

SCIENCE NEWS-LETTER

The Weekly Summary of Current Science
A SCIENCE SERVICE PUBLICATION



\$5 a Year

15c a Copy



June 14, 1930



"THE STAG AT DAWN"

A Prize for Celtic Kings in the Morning of History

(See page 374)

Vol. XVII

No. 479

Key to Riddle of Anemia Found

Medicine

A HITHERTO unknown substance found in the secretions of normal human stomachs but conspicuously absent from the stomach contents of those suffering from pernicious anemia may be the key to the medical riddle of the cause of pernicious anemia. Through researches of Drs. William B. Castle, Wilmot C. Townsend and Clark W. Heath of the Thorndike Memorial Laboratory, Boston City Hospital, it is now known that by an interaction of certain proteins contained in beef muscle and a new substance secreted by the normal stomach this peculiar anemia may be promptly alleviated.

From the standpoint of the anemia sufferer, the disease came under medical control four years ago when Dr. George R. Minot and Dr. William P. Murphy of the Harvard Medical School showed that the eating of liver in large quantities allowed the formation of red blood cells by the person with pernicious anemia. Thousands were benefitted by this discovery which was followed by a collaboration with Dr. Edwin J. Cohn of the Department of Physical Chemistry of the Harvard Medical School with the result that now small daily doses of liver extract supply the necessary principle which in the early days of the treatment could only be obtained through the consumption of more liver than pleased the palate of the average patient.

One incidental result was that beef liver, that once was mere cat food, became a high-priced meat since normal red-blooded people who really did not need it thought it would benefit them. Recently Dr. Cohn has been able to prepare experimental fractions of liver which have been successfully used for intravenous injection, the effect of a few tenths of a gram of this material equaling that of many grams of liver.

Not content with producing a virtual cure for the disease, science has pushed onward to determine the na-

ture of the substance that prevents this type of anemia and the reason for the development of the disease. Dr. Castle and his associate found that beef muscle acted upon by normal human stomach juice formed a curative substance. In a recent report to the American Society for Clinical Investigation, Dr. Castle discusses the meaning and possibilities of this new work.

The known constituents of normal human stomach secretions are hydrochloric acid and the ferments, pepsin and rennin. Although all these are conspicuously absent from the stomach contents of pernicious anemia sufferers, Dr. Castle proved by experiments that no one of these can react with beef muscle to produce a curative substance. An unidentified substance appears then to be responsible for these results.

Dr. Castle called the new substance, shown to occur in the normal stomach, "the essential factor of the normal gastric juice," and observed that none of the existing tests for stomach function would detect its presence specifically.

When the new substance is given to the patient with beef muscle in a solution that is neither acid nor alkali-

line, an effect is produced which promptly benefits pernicious anemia exactly as does liver.

Interesting experiments that may lead to a test for the potency of liver extracts have been made by Dr. Janet M. Vaughan of England who has been working at the Thorndike Memorial Laboratory with Dr. Gulli Lindh-Muller and Dr. George R. Minot, of Harvard University Medical School.

A suggestive resemblance to the characteristic condition of the bone marrow in pernicious anemia is found in healthy grain-fed pigeons. This condition in man is changed when the anemia is relieved by feeding liver or potent liver extract. If the condition can also be changed in pigeons by feeding the liver and liver extracts, this would be a method of testing the anemia-relieving power of the extract, it was thought.

Dr. Vaughan's preliminary studies indicated that this might be possible, but the results were not as yet consistent enough to allow final conclusions to be drawn as to the value of such experiments as a test for the potency of liver extracts.

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Ethyl in Britain

ETHYL gasoline has been given a good bill of health in Britain, provided its handling is attended by ordinary precautions. The questions raised regarding its safety have been investigated by a Departmental Committee on Ethyl Petrol.

The committee worked along lines somewhat similar to those followed in the earlier investigations in the United States. The aspects of the tetra ethyl lead problem on the committee's agenda included danger from lead in street fumes and dust, spillage on the skin, and evaporation and combustion fumes in closed garages. Danger of lead poisoning in the latter case was considered as considerably less than the well-recognized menace of carbon monoxide.

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The Answer Is In This Issue

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SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address

all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—\$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

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Dr. Frans Blom beside one of the carved stones discovered at Uxmal by his expedition.



Mayans Knew Tricks of Perspective

SURPRISING evidence that the prehistoric Mayan Indians knew tricks of perspective as clever as those practised by famous architects of ancient Greece has been obtained by the Tulane University expedition, led by Dr. Frans Blom, which has returned from Yucatan.

Dr. Blom, during his stop in Washington, said that some of the temple squares in the ruined city of Uxmal appear rectangular, but really are not so at all. Describing the buildings set on four sides of a court known as the Nunnery, Dr. Blom said that the south front end of the Nunnery court is wider than the north. At the same time, the north ends of the side buildings are slightly raised. To the onlooker the court appears square-cut, as it would not, paradoxically, if it were really built square and on the level.

This shows that the Mayas understood the false perspective, an architectural feature which has come to our knowledge only in recent times, Dr. Blom said.

Furthermore, the elaborately carved friezes on the facades of the buildings are tilted outward. This gives better opportunity for the onlooker to enjoy the exquisite carvings, and also produces deeper shadows which make the carvings stand out vividly.

Earlier archaeological expeditions had described how the Mayan artists used paint in connection with carved friezes in order to emphasize shadow and relief.

In examining the supposedly well-known buildings, the architect of the expedition, Prof. J. Herndon Thomson, of Tulane University, found a number of the unsuspected architectural devices which had been mastered by America's greatest prehistoric builders. Uxmal was one of the most beautifully built of all Mayan cities in Yucatan. Its large public structures, including its temples, its nunnery and headquarters of the priest-astronomers, are even today covered with carvings in exquisite design.

The experiments which these Indian architects conducted in their search for beautiful effects recall the skillful handling of perspective by the Greeks. Scholars long ago pointed out that some of the Parthenon's secrets of beauty lay in the slanting of the corner columns inward and the bulge of the columns.

It has generally been supposed that the Mayan builders put up a scaffold when they set in place the stones of a slanting arch. They did not know how to complete a true arch with a keystone. They formed a vault by pushing stones closer together, as two piles of books might be slipped into arch form. To complete the arch they filled the gap by a capstone on top. It was found that the Indian way of holding the vault stones in place during the building process was to weigh the stones on the wall side of the arch with poured concrete. This, hardening, held the stones in place and made scaffolding unnecessary.

Dr. Blom reported the discovery of twenty-three groups of buildings not heretofore recognized even in the ruins of a city so frequently visited as Uxmal. These buildings lie off in the jungle growth, away from the cleared section which contains the well-known buildings. Mayan cities consisted of a civic center in which the stone and stucco public buildings were set up with much care and labor. Off from this heart of the community radiated the thatched huts of the people. The area of the public buildings in Uxmal shows the great size of the city, and fits in with its traditional importance in Mayan affairs.

Penetrating the thick underbrush, the expedition also found three pools which solve the mystery of Uxmal's water supply. It has been a point for argument that the city seemed without water.

In the center of the city, Dr. Blom made his discovery of a large, terraced mound on which stand 19 monoliths. These stone markers of history are carved with human figures representing the type of people who lived in the Mayan metropolis, and some have bands of hieroglyphics recording dates in the laborious Mayan method of stringing together a series of picture symbols.

Some accident or dramatic happening occurred on this monument hill in the past. In the center of the terrace on which the monuments stood was a deep hole, like (*Turn to next page*)



Reproducing carvings at Uxmal. Plaster casts, drawings and photographs are all used to obtain an accurate record of ancient Maya art.

a shell hole, and the monuments were thrown on all sides. This led Dr. Blom to infer that a treasure hunter excavated there at some time with dynamite. If so, the vandal seeker for gold did not realize that the carved stones all about him were a find of great interest though not the financial haul he sought.

The important monuments, when deciphered, have proved that Uxmal dates back to 500 A. D., which adds some five hundred years to its sup-

posed career. The finding of these date stones adds weight to the evidence that Yucatan was discovered or settled by Mayan immigrants many centuries earlier than had been supposed. It is known that the Mayas established an Old Empire in the south, in Guatemala and Honduras, and then abandoned it, no one knows why, to move northward, and build a New Empire in Yucatan. The recent discoveries of date stones which are read as being of the fourth to the sixth

centuries in Yucatan show that the northern migration took place earlier and perhaps more slowly than archaeologists had thought.

Dr. Blom's study of the Uxmal ruins included the making of 70 detailed architectural drawings of the section called the Nunnery Quadrangle. Plans for the Chicago World's Fair of 1933 call for the reproduction of this bit of ancient America to be set down in a five acre space with as much of the atmosphere of a Mayan city of a thousand years ago as can be captured and reproduced.

The Nunnery is the one building in Uxmal which can be labeled with certainty. Other buildings have romantic names, as the House of the Magician, the House of the Governor, but the Nunnery is historically recorded as such in a Spanish document. The writer describes the court with its cells on each side and explains that these cells housed the maidens who served religion as the Vestal Virgins of Rome did.

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Serum - Fed Calves Safe From Disease

Veterinary Medicine

THE control of bovine tuberculosis by immediate isolation of new-born calves from infected mothers is the latest victory of the Rockefeller Institute scientists, a victory equivalent to many million dollars of agricultural relief, it appears from a recent report of work done by Drs. Theobald Smith and Ralph R. Little, at the Institute's department of animal pathology at Princeton, N. J.

Calves born from tuberculous cows are at birth usually free from the disease. A large percentage of them soon acquire it, however, from contact with infected mothers. Attempts to prevent the spread of tuberculosis to the second generation in an infected herd by immediately separating the new-born calves from the diseased mothers have not been successful heretofore.

In spite of the most careful hygienic care, practically all the calves

thus isolated developed gastro-intestinal disease, joint disease, or blood-poisoning. Fully four-fifths of them died within the first few days.

Bacteriological examination of these calves has shown that death is usually not due to the common contagious diseases, but to invasion of the living tissues by the ordinary colon bacillus, dung bacillus or other presumably harmless environmental micro-organisms. Evidently the calf at birth is unprepared to resist invasion by ordinarily harmless bacteria, micro-organisms causing practically no disturbance in adult cows.

It has been found, however, that calves thus isolated will remain free from such infections if they are allowed one natural feeding before separation from the diseased mother. In this feeding they do not obtain the usual milk, but a specially secreted pre-milk, or colostrum. One colostrum feeding is usually sufficient to

immunize a new-born calf against the usual non-pathogenic environmental bacteria. Practically all calves thus fed may be successfully raised by artificial feeding.

Veterinarians have concluded from this that there is present in the pre-milk or colostrum some highly efficient natural antidote, specially designed to overcome the birth handicap. The nature of this colostrum antidote has been the subject of intensive research. Now the Rockefeller Institute scientists have found that the normal colostrum antidote is identical with, or at least similar to the normal biological antiseptic in adult cow's blood. Calves may be protected from the usual post-natal infections by one or more initial feedings with adult cow serum. They lost but one calf out of ten after such a preliminary serum meal.

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Substandard Ergot May Be Harmless

Medicine

Commission Formed To Investigate Its Effects

WHETHER or not officials of the food and Drug Administration of the Department of Agriculture have been lax in enforcing the laws and allowed the sale of deteriorated ergot, the health and safety of American mothers may not have been so much affected after all, it appeared from testimony presented at the hearing before the Senate committee on agriculture and forests.

That the food and drug officials were allowing the illegal sale of a fluidextract from rotten, mouldy, wormy ergot was charged by Howard W. Ambruster, drug importer of New York City. Ambruster has claimed that because this substandard ergot was allowed to be imported and sold, he could not find a market for his own superior but slightly more expensive importation. Ambruster has placed considerable emphasis on the fact that this drug is widely used in childbirth and that the lives and health of American mothers are imperilled because a substandard product is on the market.

Prof. Torald Sollman of Western Reserve University said that he was not sure whether it would be dangerous to use a fluidextract made from rotten, mouldy ergot. He did think it would be undesirable, but on further questioning stated that the rottenness or mouldiness or worminess of the crude ergot would not affect the physiological activity of the fluidextract and that as long as the extract was of the standard physiological strength, he did not think any harm would result from using it.

Prof. Sollmann said he had no evidence that the Department of Agriculture was derelict in its duty in respect to the enforcement of the food and drug law, and that his impression was quite the other way.

Prof. Henry H. Rusby of the New York College of Pharmacy, Columbia University, Dr. E. J. Ill, chairman of the special ergot investigation committee of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and Dr. Harvey Wiley, father of the food and drug law, were heard at the first day's hearing. Dr. Wiley said that while he has the highest respect for the officers of the Food and Drug Ad-

ministration, he feels that the charges against them are just in many respects.

Dr. Rusby's testimony brought out the fact that there is no reliable test for the efficacy of fluid extract of ergot except the clinical one which the doctor makes when he gives it to his patient. For this reason it is necessary that the fluid extract be made only from ergot of the best quality, as specified in the U. S. Pharmacopoeia, which is the legal standard. For some years prior to 1927, officials of the Food and Drug Administration were allowing substandard ergot to be used in the manufacture of the extract, if the latter could be made to meet a biological test. This is in violation of the law, Dr. Rusby charged.

Upon questioning by Senator Royal S. Copeland of New York City, himself a physician, Dr. Rusby admitted that there is a point in the manufacture of the fluidextract when no one could tell except by clinical test whether the extract is any good or not. Lack of funds for sufficient inspection by the Food and Drug Administration was suggested as a factor in the situation. To this Dr. Rusby heartily agreed.

AN investigation of possible harmfulness of ergot fluid extract when it is made from moldy or wormy ergot is shortly to be undertaken by a scientific commission to be appointed by Dr. E. Fullerton Cook, of Philadelphia, chairman of the Committee on Revision of the Pharmacopoeia of the United States.

Dr. Cook said it was his interpretation of the present law that sub-standard raw materials could come in providing they were plainly labeled as being below standard in certain particulars. He said it was the custom of the Food and Drugs administration to allow reliable manufacturers to take such raw material and make therefrom drugs which in their manufactured state would clearly meet the requirements of the U. S. Pharmacopoeia. Benzoin was a point in instance, he said. Nature had not met the requirements of the U. S. Pharmacopoeia in some years, but the tincture of benzoin put upon the

market would be up to standard, nevertheless.

So far as ergot is concerned, Dr. Cook said there was no scientific evidence as to what harm might be done by the fluid extract made from raw material which was moldy and wormy, though certain requirements of potency might be met by the cockscomb test. He said he wanted it clearly understood that he was not endorsing the use of moldy or wormy material.

If the scientific tests show that harm does result and that women are in danger of infection from the use of ergot made from the poor quality raw material, he said that the requirements would be so modified as to make an exception in the case of ergot with the effect that the U. S. Pharmacopoeia standard would virtually put an embargo on fluid extract made from moldy or wormy material.

Senator Burton K. Wheeler of Montana, at whose insistence the hearings have been held, believes that the present airing of facts will clear up the entire ergot situation.

"What is inconceivable to me," he states, "is that no tests have ever been made to determine what bad effect this fluid extract might have when made from impure materials."

I understand that instead of making such tests, doctors have simply declined to run the risk of using it, and in many cases have abandoned this type of treatment."

The Department of Agriculture becomes perhaps unjustly subject to criticism as a result of the loophole in the law which allows sub-standard material to come in and be put in the hands of manufacturers, Senator Wheeler asserted.

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Mayan Indians of the prehistoric American tropics used pottery stamps to impress colored designs on their bodies, according to J. Eric Thompson, archaeologist.

More than 8,000 specimens of flowers and other forms of plant life of the Amazon Valley have been collected by the Marshall Field Botanical Expedition to the Amazon.

1,500,000,000 Years of Life Portrayed In Great Hall Of Paintings

Paleontology

By Frank Thone

FIFTEEN hundred million years of life on this planet will be unrolled as a single connected epic in a series of three majestic new halls planned for the Field Museum of Natural History in Chicago. Fossils, rocks, mounted plant and animal specimens, paintings and statuary will be so arranged that he who walks may read the cosmic Book of Genesis which has never ceased to be written since that ageless day when the heavens and earth rose out of chaos.

This project, Roman in the magnificence of its scope, Greek in the simplicity and directness of its principal theme, Gothic in the meticulous detail of its execution, will be put through with modern American speed. As a matter of fact, the first third of it is already practically completed, and the whole idea will have become a reality by 1933.

The hall, now in its final stages of development, will give an idea of the scale and swing of the entire concept. This is the Ernest R. Graham Hall of Historical Geology, named for the donor who made possible the arrangement of this group of exhibits. The visitor finds himself in a walled and ceilinged space so nearly Assyrian in its proportions that one hesitates to call it a room.

The free space in the center is occupied by mounted skeletons of the enormous vegetarian dinosaurs that bulk as high and wide as a freight car, and with their interminable necks and trailing tails are as long as a freight train—a tolerably short freight train, at least. With them are the smaller, but still huge, carnivorous dinosaurs that preyed on their bulking carcasses—creatures with barn-door mouths and railroad-spike teeth. With them also are much later comers,

such as the mammoths and mastodons and the extinct giant Irish deer, the most magnificent animal of his tribe that ever walked the earth.

Around the wall, so arranged that they get the benefit of the light from the lofty windows, are cases of smaller exhibits of fossil animal and plant remains; but the dominating note in the whole great room is the series of paintings on the walls. They are the work of Charles R. Knight, the eminent New York artist who has devoted his life to the painting of beasts and landscapes no human eye ever saw. Through the frames of these pictures you can look down vistas of uncounted millenia of past time, and brushing aside the mists of antiquity you can see mososaur and mammoth and moa, with their flesh and scales and feathers all put back by the careful imagination of the scientist-painter, against the background of primeval sea or tundra or

jungle, just as they knew it when they lived.

At first it may appear that these great paintings are simply a disconnected group of scenes, taken at random from the old earth's immemorial past. But if you look a little longer you soon see that there is a definite system in their arrangement, and that they are not only related to each other but to the exhibits of skeletal and fossilized material ranged beneath them. They are in an orderly series, set in the natural evolutionary sequence, so that each picture with its associated group of exhibits constitutes a chapter in the geological history of the earth.

A walk through the hall is a reading of a great book, and how much you get out of it will depend on how much of a hurry you are in. You may have only a few minutes before traintime, and so stride through rapidly, as you would leaf over a big



"Let the waters bring forth"
—Low tide on an Ordovician
beach, with orthocerans and
trilobites.

"Monstrous dragons of the prime"—Terri-fied tortoise makes a meal for a Mosasaurus; hopeful pterosaurs wait for the scraps.



book you didn't have time to read carefully. Or you may have leisure to saunter slowly, or to return for many visits, taking a little at a time, as you would carefully chew over a volume that interests you, paragraph by paragraph.

The first page of this heroic-size picture-book of the world's history suggests conditions as they may have been "in the beginning," when earth and clouds and sea struggled to separate themselves. Black, bare and forbidding, the crags and cliffs rear themselves out of the sullen and lifeless sea, earth and water still reeking with the throes of continental birth. This picture, necessarily the most imaginative of the series, is probably valid whether one holds with European geologists to the old Laplacian hypothesis of an originally molten earth, or believes with the American school in the Chamberlin-Moulton theory of an earth gathered together out of drifting "planetesimal" particles in space, like a gigantic snowball. For even such an agglomerated planet would probably be so heated up by the bombarding rain of particles, and heave and strain itself so much in the age-long adjustments of newly acquired loads, that its surface would be pretty hot for a long time.

But at last the sea stops boiling and simmers down to a reasonable coolness, and some kind of life becomes possible in the waters. And here comes Knight's second picture, wherein he sets down what may be imagined of the first abiding-place of living things on the earth.

This painting seems to have been inspired very strongly by the beautiful travertine terraces at Mammoth Hot Springs in Yellowstone National Park. It is not improbable that the first life appeared in such warm springs—for in spite of their con-

stant bubbling, the hot springs of the Yellowstone country and a thousand other places on this planet are not boiling. They may be too hot for you and me, but for the more primitive children of nature, especially certain bacteria and blue-green algae, they are at just the right temperature. The physiological processes of these plants seem to be simpler in some respects than those of any other group of living things, so that some scientists have conjectured that the brilliant microscopic plants that paint hot spring basins with their massed and matted bodies may be the least modified of all the varied descendants of the archancestral types of organic life. The artist has adopted this hypothesis, and in this picture we see the beginnings of the drama of life, more than a thousand million years ago.

Then the artist takes a leap ahead in time for many millions of years, and shows us a sea-beach of the Ordovician period. The sea is a normal sort of a sea now, and the rocks and sand of the beach are such as you might find on the coast of Maine or California today. But the creatures left by the receding tide are quite another story. The dominating animals are a couple of huge creatures that look like octopuses stuffed into the ends of big megaphones. In effect, they are just that. They are relatives of the modern octopuses and squids, and even closer relatives of the present-day nautilus. These nautiluses with uncoiled shells have left abundant evidences of their one-time existence in the oldest rocks. To scientists the tribe is known as the *Orthoceros* group: the name means "straight-horn."

Even more interesting are the two queer creatures burrowing in the sand, just out of reach of the arms of the orthocerans. They look like gigantic editions of the little pillbugs you can

find under almost any board or stone in a damp place, and they are at least distant cousins of theirs. They are trilobites, earliest representatives of the great and widely distributed crustacean family, whose edible members we know today as lobsters, crabs and shrimps. Like the orthocerans, the trilobites are now completely extinct.

Again a gap of millions of years, and the artist brings us to the site of Chicago. But there is no city there, no Lake Michigan, no rolling prairies. Where the hills of green land now stand like solidified waves, there is a level plain of green water. The sea flowed here, a shallow, tropical sea; and the place that is some day to be northern Illinois is a vast complex of coral reefs. The outcrops of this coral rock can still be seen in the southern suburbs of Chicago, with the curved cups of the horn coral persisting where they grew uncounted ages ago.

Another great leap forward in time, and Mr. Knight has us among the dinosaurs, those most fascinating and awesome of all the big beasts we are thankful that we don't have to meet in the dark. There is a painting of the immense *Apatosaurus*, one of the tribe of pin-headed, sea-serpent-tailed monsters that were the hugest animals that ever walked on four legs and next to modern whales the largest animals that ever lived.

The youthful days of the shielded dinosaurs are shown in another scene, where a covey of young saurians, recently hatched from the egg, are disporting themselves on the sand and nibbling at the low herbage. Dinosaurs, like all reptiles, were egg-laying animals, and presumably all young dinosaurs first saw the light of day in a nest in the sand or earth. But it was not until a few years ago that Roy Chapman Andrews scored one of the prime triumphs of paleontology by actually (*Turn to page 378*)

Insect Virtuosi

THE ordinary little black cricket that chirps and chirps and nearly drives you to distraction when you want to sleep, is a more skilful fiddler than Fritz Kreisler or Jascha Heifetz. He can play a full-tone slur in a fiftieth of a second, and that on a pair of notes that a master-violinist can reach only by sliding his finger 'way down on the E-string. And he repeats the feat four times at every stroke of his bow.

Some of the musical secrets of these insect virtuosi have been discovered by Dr. Frank E. Lutz and W. R. Hicks, of the American Museum of Natural History. They assisted at the production of the first "talkie," or more accurately the first "chirpie," of a performing cricket that has ever been made. Afterwards they made a study, with a microscope measuring device, of the alternating shadows and clear bands on the edge of the movietone film that record and reproduce the sounds.

They found out some things, by sight, that the human ear is too sluggish to hear as sound when a cricket chirps. They learned that the insect does not slide the tiny file near the edge of his wing clear across the other wing-edge at one stroke to produce a chirp. Each chirp, as recorded on the film, separates itself into about four subdivisions, which Dr. Lutz calls "pulses," with imperceptible pauses in between. Each "pulse" lasts on the average a fiftieth of a second, and each pause somewhat less than that. But the human ear, because of its innate sluggishness, perceives the whole performance as a single sound.

A closer examination of a single "pulse" shows that it starts at the high pitch of fifth "D" above middle "C" of the piano keyboard. It rises momentarily a little higher, then slurs downward approximately a whole tone. And all in about a fiftieth of a second.

Entomology

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Sorts Colors

A NEW use for the photoelectric cell has been found in which the "electric eye" again proves its superiority to the human eye for comparing colors. Textiles of slightly varying shades are now classified by the photoelectric cell more expertly than can be done by manual operatives.

This cell is also the heart of television, it picks cigars of choicest

color, and warns when the exhaust smoke in Holland vehicular tunnel under the Hudson river becomes dangerous. Its new application was publicly demonstrated for the first time recently before the New York Electrical Society by the inventors, Dr. H. H. Sheldon and Dr. W. A. Schneider, physicists of New York University.

Dr. Sheldon explained that two cells are used which create a balanced circuit and hold a deflecting needle at zero when both receive the same amount of light. But when the color of the article under one cell is different from that of the article under the other, different amounts of light are reflected to the cells, different currents pass through them and the needle becomes unbalanced and swings away from zero. The needle will vary even when the shades look exactly alike to the human eye.

Error may be introduced by the effects of weave and sheen. Weave effect is overcome by rotation, which melts the pattern into one solid mass of color. Sheen is counteracted by the use of a spherical photometer in which light is reflected from the cloth in all directions so that a concentration of light at any one point is eliminated.

Electricity

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Old at 30

"PARADOXICAL as it may sound, many a young girl of 29 in search of a job suddenly discovers that she is an old woman," Caroline Manning, of the Women's Bureau, U. S. Department of Labor, told the National Conference of Social Work, meeting this week in Boston.

Industry demands extreme youth, preferring to initiate girls 18 to 21 years into the running of its machines, feeding its presses and handling its telephone lines. Women of 25 years find it hard to get a job when a factory closes, as many cigar making plants have recently closed in order to open elsewhere as consolidated shops using machinery for the old hand tasks, Miss Manning showed. Women over 40 find the situation almost hopeless.

Employment is becoming increasingly precarious for women beyond 25 or 30 years, she reported. The need for scientific information as to what human beings of different ages can learn and accomplish was shown by the speaker, who said:

"Industry is acting upon the assumption that you cannot teach an

IN VARIOUS S

old dog new tricks, and has not used practical tests to demonstrate fitness for simple jobs. Nor has it proved that other qualities may not compensate for loss of speed.

"If a woman of 30 can learn to run an airplane, or if a woman of 50 can learn to drive an automobile, she certainly should be given a chance to demonstrate the fact that she can watch an automatic weighing machine, or pull the lever that starts or stops a wrapping machine, for such modern equipment demands little more than this from the girl who is merely the tender of a machine."

The maximum hiring age limit for women is now ten years lower than for men, Miss Manning reported.

Sociology—Employment

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Emergency Power

FOLLOWING the precedent set by the airplane carrier "Lexington" in supplying Tacoma, Wash., with emergency electrical power during the past winter, the "Jacona," a 7,000 ton merchantman built by the United States for war use, is being groomed at the Newport News Shipbuilding and Dry Dock Co., for permanent service as a transient power plant to coastal cities of Maine and New Hampshire.

Although two 13,400 horsepower turbine-driven generators are being permanently installed in the "Jacona," the vessel is to be used only in cases of emergency. She will be a steam auxiliary for use in time of drought and transmission line failure, the Central Maine Power Company, for whom the vessel is being reconditioned, explains.

Many small communities are furnished electricity by this company almost entirely from water power plants. Emergency steam generating equipment is necessary, but it is very expensive to have enough small steam plants in right places when drought comes or to build transmission lines for sending the power a great distance from a central plant.

The additional reserve capacity on shipboard which can be quickly towed wherever needed is expected to overcome both difficulties. The power company believes this plant aboard ship can be used twice as much as if it were fixed in one locality.

The turbines will take steam at 400

SCIENCE FIELDS

pounds per square inch, a much higher pressure than in most plants. The boilers are to burn oil, but provision is being made for the installation of additional boilers whenever it becomes more economical to burn coal.

Because of close quarters and possible dampness on board ship, the 11,000 volt bus bars of the switching equipment will be insulated. In stationary plants they are nearly always left uncovered.

In spite of a decade of idleness the "Jacona" was found in very good condition. She is an oil burner 380 feet long, of 50-foot beam and 26-foot draft. All old machinery has been removed, but tanks beneath her false bottom and other tanks fore and aft are being left for water ballast.

Electrical Engineering

Science News-Letter, June 14, 1930

Oil Safe

EVIDENCE that the refined mineral oils used medically will not cause cancer has just been reported to the American Medical Association by Dr. Francis Carter Wood of the Columbia University Institute of Cancer Research.

The fact that cancer frequently occurred in human beings as a result of contact with lubricating oils has caused considerable alarm among patients who were taking mineral oil for medical purposes. Dr. Wood's scientific experiments showed that there is no ground for this alarm.

Dr. Wood tested the effects of mineral and lubricating oils, both externally and internally, on white mice of a strain whose history and liability to develop cancer were known. Several well-known makes of medical mineral oil were used.

He painted the skin of the mice with mineral oil of the type used medically but no cancer developed. Then he painted them with heavy lubricating oil and produced a few tumors. Painting with tar produced both tumors and cancer.

Feeding both the mice and white rats with medicinal oil did not cause cancer of the gastro-intestinal tract.

The skin of the white mouse is quite as sensitive to oil irritation as the human skin, and both white mice and rats have spontaneous cancer of the intestines. Consequently if the refined oils used did not produce cancer

in these animals, there is no reason to believe that it will produce cancer in human beings, Dr. Wood concluded.

Incidentally he pointed out that petrolatum has been used extensively in recent years as the basis of medical ointments, as well as for internal medication, but no cancer has been reported as a result. Also a lighter grade of mineral oil has been used for nasal sprays without any evidence of cancer resulting.

These general observations, together with the scientific experiments seem to dispel definitely the fear of getting cancer from mineral oil of the type used for medical treatment.

Medicine

Science News-Letter, June 14, 1930

Engineering and Science

EVERY application of science presupposes a discovery of science to be applied, so that the useful applications of science are in the last analysis limited by the extent to which scientific research has been successful in uncovering the hidden forces of Nature."

With these words Dr. Karl Taylor Compton, formerly professor of physics at Princeton, upon the occasion of his inauguration as president of the Massachusetts Institute of Technology emphasized the importance of pure science to engineering. Dr. Compton continued:

"Then, when these scientific discoveries are put to the service of man, there is always a limit to the available extent of this service, a limit set by some such thing as a defect of material, inability to solve an equation, or some disturbing factor. So here again it is the province of research to push back or remove these limitations. While, therefore, in its humble beginnings, the greatest service of an institute of technology might very well have been to acquaint men with the laws of science and the technique of their application, an institute of technology today, to perform its greatest service, must take the lead in actually developing science and its applications as well as in technological instruction. In fact no proper or adequate teaching in these days can be done except as it is permeated with the spirit of research, for every constructive activity of life which is not mere routine consists of the continual endeavor to solve problems, in which broad training in fundamental principles and the inculcation of the true spirit of research constitute the best possible preparation."

Engineering

Science News-Letter, June 14, 1930

Mountain Building

ARE the mountains of the earth the result of enormous "puffs" of internal energy, coming at intervals of millions of years, after the manner of a teakettle lid being lifted by puffs of steam at intervals of a few seconds?

This suggestion, one of the "grand ideas" of geology, was put forth in a Columbia Broadcasting System radio talk by Prof. A. C. Lane, given under the auspices of Science Service. Prof. Lane is head of the geology department of Tufts College, consultant in science of the Library of Congress, and chairman of the National Research Council's subcommittee on the estimation of geologic time.

"It is a task for geologists to work out these cycles and see if they have about the length indicated—24 million years," said Prof. Lane. "There are numerous ways of so doing. For instance, as we tell the age of a horse by the wearing down of his teeth, so we can estimate the age of mountains. The younger mountains, the Himalayas and the Rockies, are higher. In the older mountains like the Appalachians and those around Lake Superior the folds have been bevelled off until it is literally true that the valleys have been exalted and the hills laid low. Estimating the load carried by the rivers we may estimate how fast this action has been going on. It has been estimated that 15,000 feet of strata have been removed from the region of the Rockies and the Grand Canyon of the Colorado in the last two periods at a rate of perhaps one foot in 3000 years. This would make the length of these cycles 45 to 60 million years. The thickness of the beds deposited may also be used to base an estimate."

Geology

Science News-Letter, June 14, 1930

Safer

INCREASES in transatlantic and coastwise shipping are causing the addition of half a dozen 12-ton buoys to the waterways of New York harbor. The installation is to be made during June by the U. S. Lighthouse Service, the Department of Commerce announces.

All the new buoys will display flashing lights and five will have bells. They will mark the channel from the Statue of Liberty and Governor's Island to the Narrows.

Shipping

Science News-Letter, June 14, 1930

Fifteen Hundred Million Years of Life—Continued

finding dinosaur eggs in the Mongolian desert.

The weirdest dinosaurs that ever walked fill another frame. These were the Stegosaurus, strange, high-hipped monsters with huge bony plates as big as sidewalk slabs standing up edgewise in a double row along their backs. These presumably prevented their hungry neighbors from attacking them in the most vulnerable spot, the spine. Two pairs of wickedly curved natural sabers on the swinging tail served as discouragers to flank attacks.

There were saurians in the sea and in the air as well as on land in the days when the reptiles ruled the earth. One picture shows a great sea-turtle making panic-stricken efforts to escape the gaping jaws of a Mososaurus, the one and original genuine sea-serpent. Indifferent to the fate of the poor turtle, perhaps even hopeful of picking up a few scraps when he has been hacked up by the great saurian's teeth, a flock of pterosaurs swoop and circle overhead.

The last great leap of the artistic-scientific seven-millennium boots brings us down to comparatively modern times. Mammals have arrived. But some of them are mighty queer to look at.

The favorite, of course, is the tremendous mastodon, the woolly elephant that roamed the northern lands during the Ice Age and apparently thrived on the cold. Prehistoric man knew and hunted this animal, ate his flesh and carved pictures of himself on his own ivory tusks.

There are two other animals, American this time, that certainly survived on the earth when man had put in his appearance, though whether man was here on this continent to see them and hunt them remains a very much disputed question. One of these was the giant ground-sloth, whose only surviving relatives, the Ai and the Unau, live in trees in Central and South America, and in crossword puzzles in the United States. The other was a giant armadillo, with a war-like spiked club on the end of his tail for the more cordial reception of bears, saber-tooth tigers, and such roving gentry. Another big armadillo lacked the spiky club-head, but had row on row of lesser spikes or knobs the full length of his tail, which probably answered the purpose about as well.

The bears are represented, too: a pair of shaggy cave-bruins, looking

out on a cold world and wondering, as a bear always does, where there is something to eat. Cave-men knew these bears as they knew the mastodons. They hunted them; and if they were anything like our modern Indians in their mental makeup they also "made medicine" in their honor, considering them the incarnation of mighty spirits.

In a way, the most thrilling picture of the whole collection is that of the giant Irish deer, higher than a tall man's head at his magnificent shoulders, and with his palmated antlers, more like the horns of a moose than those of a deer, spreading out nearly six feet on either side of his great head. A proud man was the tribal king in Ireland who could mark down one of these splendid animals as meat for his people and as a trophy for himself.

But all this show of beasts is by way of preface to the entrance of that strange creature who finds himself in the natural world, sees that he is a part of it, and yet feels that in some way he is apart from it and will not rest until he has made it subject to him—man. Man also is to be represented fully in a Hall of Prehistoric Man. The story here will not be told in paintings but by groups of life-sized figures executed by Frederick Blaschke, an able sculptor.

So far, one sculptured group has been completed, out of several that are planned. This is the Neanderthal cave, showing elders, youths and children of the earliest human race of which we have enough skeletal remains to undertake a restoration with anything like full confidence.

The artist has not tried to flatter these our remote grandparents—or more likely, remote great-uncles and aunts. Neither has he tried to degrade them and show them as more ape-like than they were. They're not as pretty as we might like to have all the portraits in the family album, but they're human nevertheless, and they are carrying on a lot of activities of a decidedly human character. They have formed a human family, they make and wear clothes (admittedly of a sketchy character, but still clothes), they make and use tools and weapons, they have a division of labor among the group.

They have not yet domesticated any animal, not even a dog; but they have tamed something vastly more important than any animal. They

have captured and controlled Fire. Ugly as he undeniably is, Uncle Neanderthal is Prometheus. With all our high-brow modern cleverness, our Archimedes learning the rules of the lever, our Newton binding the universe together with invisible cords of power, our Einstein turning the heavens inside out, we have never done anything more important for the race than that. Call Uncle Neanderthal a bonehead if you like; he knew enough to come in out of the rain, and indoors he had for his comfort, tamed and shackled and tractable, the most powerful and terrible of all the spirits of the forest—Fire.

This much you can see in the Hall of the History of the Earth if you go to the Field Museum now. There will be more groups of early human beings, especially those splendid six-footers the Crô-Magnon race, the first artists in the world. Further sculptured families will bring the story told in this hall down to the earliest dawn of known history, perhaps 10,000 B. C.

The third of the halls will be known as the Chauncey Keep Hall of Physical Anthropology. Here the story will be told of human life on the earth as it is today. The skeletons of man and his nearest animal analogues will stand side by side for comparison and measurement, and a series of twenty full-length life-size figures will illustrate the physical characteristics of all the principal living races of men.

Science News-Letter, June 14, 1930

Crushes Steel

THE strength of the prehistoric dinosaur is dwarfed beside that of a huge testing machine installed recently at the University of Illinois.

This machine crushes steel and concrete with as much ease as a man mashes a piece of dirt beneath his foot. It stretches iron rods as if they were taffy candy. In fact, it can exert as much as 3,000,000 pounds pressure in either tension or compression, either to pull things apart or to squeeze them together.

Building beams 35½ feet long can be tested. The screw that is used to concentrate the great pressure is more than 57 feet long and one foot in diameter. The machine stands nearly 50 feet above floor level and extends 14 feet below. It weighs 140 tons.

*Engineering
Science News-Letter, June 14, 1930*

Safe Mooring for Dirigible

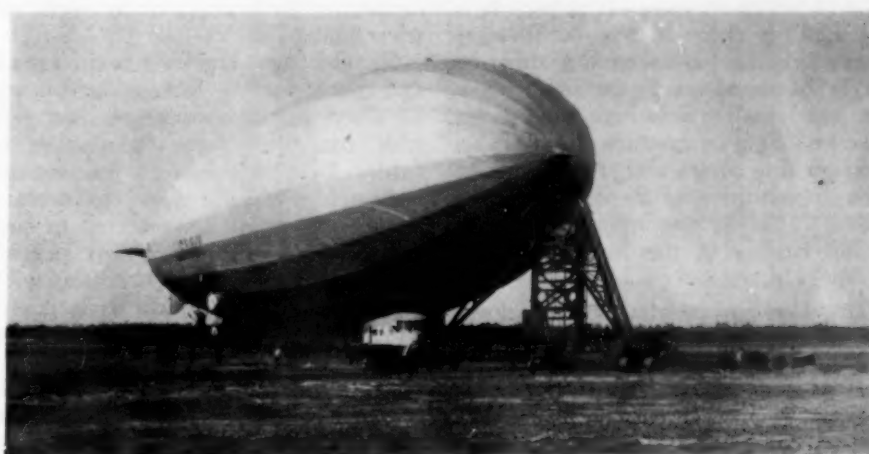
Aeronautics

New Device Now Tethers the Los Angeles

THE Los Angeles is now brought to earth and made secure by a few score men instead of a few hundred. A mobile "stub" mooring mast is the heart of the new apparatus developed by the U. S. Navy which has pulled down and housed the huge dirigible in a 20 mile-an-hour cross-wind with much greater speed and safety than the operation used to be performed by hundreds of men.

The new system secures the airship at both ends and overcomes the great danger of damage from vertical winds to which the ship is subjected when attached by only one end to a mast even as tall as 200 feet. It provides a circular railroad track surrounding a mast only 60 feet high. The nose of the dirigible is fixed to the mast in the usual way while the tail rests on a special railroad car.

The airship then follows the direction of the wind like a weather vane, swinging about its nose on the circular track. Being fixed at both ends and yet able to respond to wind



changes, the craft can be brought very close to the ground without danger and made easily accessible for repairs.

To put the airship into the hangar its stern is detached from the railroad car and placed on a pneumatic wheel device capable of casting in any direction like a chair roller. The

stub mast at the other end is then drawn by a tractor toward the hangar. As the docking rails which extend from the hangar are reached the stern is fixed to them by cables so that the ship will not be battered about by the wind.

Science News-Letter, June 14, 1930

New Comet

A NEW comet has been discovered in the southern heavens by a veteran amateur comet discoverer, David Lamont Forbes of Rondebosch, South Africa, the International Bureau of Astronomic Telegrams at Copenhagen has been informed.

It is of the ninth magnitude, too faint to be seen by the unaided eye, and is not far in heavenly location from the bright star Fomalhaut in the constellation of Piscis Australis, now visible only from the southern hemisphere.

On Monday, June 2, when the discovery was made, it was located at right ascension 23 hours 33 minutes 56 seconds and declination south 32 degrees 48 minutes 33 seconds. It has no plainly visible tail. It is moving slowly southward in the sky at the rate of 24 seconds a day but its future course in the heavens can be told only after more observations are obtained.

The new comet is not the comet 1930d which has recently been under observation by American observatories.

Astronomy

Science News-Letter, June 14, 1930

Oxford Child Godmother to Pluto

Astronomy

PLUTO, the new planet, known as Planet X before its christening by its discoverers, has a juvenile godmother in the person of an eleven-year-old girl of Oxford, England, Miss Venetia Burney. Shortly after the discovery of the new planet by astronomers at Lowell Observatory, Prof. H. H. Turner, the Oxford astronomer, cabled to Prof. V. M. Slipher, director, Miss Burney's suggestion that the planet be named Pluto and in the official announcement of the naming Prof. Slipher acknowledges the suggestion as the first to be received.

Minerva was another popular suggestion but as it has long been used for one of the asteroids this prevented the new planet from bearing the name of the goddess of wisdom. Prof. Slipher suggests that a fitting symbol to go with the name will be a device made of the two first letters of the name Pluto capitalized, an L partially superimposed on a P. Incidentally, these are the initials of the late Prof. Percival Lowell whose studies inaugurated the search that resulted in the discovery of Pluto.

Other astronomers, notably Prof. E. W. Brown of Yale, in a recent communication to the National Academy of Sciences, have concluded that Prof. Lowell's computations of some twenty years ago did not precisely predict the location of Pluto. Prof. Slipher answers this criticism indirectly when he writes in a Lowell Observatory Circular that Pluto "appears to be a trans-Neptunian, non-cometary, non-asteroidal body that fits substantially Lowell's predicted longitude, inclination and distance for his Planet X. Lowell considered his predicted data as only approximate, and a one to one correspondence between forecast and find would not be expected by those familiar with the problem. As he himself said in his Trans-Neptunian Planet Memoir: 'Analytics thought to promise the precision of a rifle and finds it must rely upon the promiscuity of a shot gun.' This remarkable trans-Neptunian planetary body has been found as a direct result of Lowell's work, planning and convictions and there appears present justification for referring to it as his Planet X."

Science News-Letter, June 14, 1930

Microbes Have Invisible Stage

Bacteriology

Many Bacteria May Lead Protean Lives

SCIENTISTS have often been baffled in their search for disease germs because germs have a stage or stages of development in which they are too small to be recognized by microscopic examination, filtrable through fine filters and, for a time at least, non-cultivable by ordinary methods. This is the opinion of Dr. Philip Hadley of the Medical School of the University of Michigan.

Dr. Hadley, internationally known for his studies on the curious transformations which bacteria undergo in artificial cultures and in the body, told a gathering of scientists at Ann Arbor that he had been successful repeatedly in causing disease-producing bacteria, appearing under the microscope and in cultures in the conventional form, to undergo dissociative changes which rendered them invisible, and filtrable through fine-grained earthen and porcelain filter candles. After further laboratory procedures these minute bodies were made to re-develop into the "normal" form. Sometimes weeks

or months were required to effect this reversion.

Should Dr. Hadley's experiments and conclusions be correct—and it was admitted that it was more than possible that they were—a number of firmly held notions in present-day bacteriology would seem to demand some revision. This referred to such matters as valid criteria for judging the sterility of normal or pathological tissues and body fluids, criteria for judging when a bacterial culture was really dead, the true significance of so-called "bacteriolysis" and the bacteriophage phenomenon; also perhaps, the biological relation between the filtrable forms of bacteria and some of the so-called filtrable viruses.

Dr. Hadley emphasized the need of studying bacteria not alone with reference to the ordinary form that is well known to bacteriologists and described in the textbooks, but also with reference to the other cyclostages in which the organisms may masquerade for a time, and in which form they are sel-

dom recognized. One of the most important of these is the filtrable form which occurs in the G-type culture.

The speaker voiced the opinion that, contrary to the common belief, any bacterial species in its entirety is not so simple a thing that it can be revealed by a study of a single cell or a single culture; but that it is highly intricate in its cellular organization. This might be taken to mean that far more remains to be discovered regarding the complex biology of many "well-known" microbes than is already known by bacteriologists today.

Science News-Letter, June 14, 1930

Plant Patents

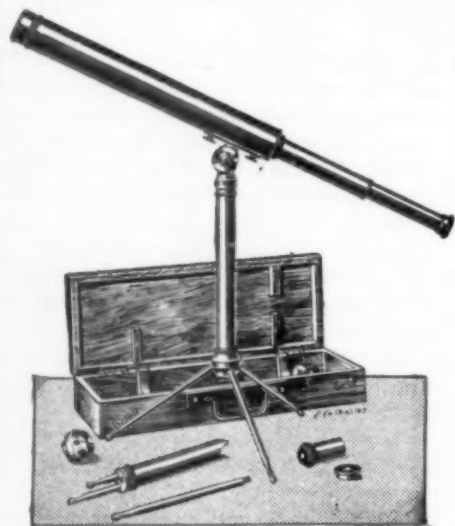
THE plant patents bill, which makes it possible for plant breeders to protect their new hybrids as though they were mechanical or chemical inventions, has been passed by both houses of Congress and signed by President Hoover, making it law. The terms of the act extend protection only to plants that are propagated by cuttings, grafts and similar asexual methods; not to new varieties of plants propagated by seeds.

Horticulture

Science News-Letter, June 14, 1930

The common cold is more common among young men in their twenties than among middle-aged men, statisticians have found.

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NATURE RAMBLINGS

By Frank Thone



Columbine

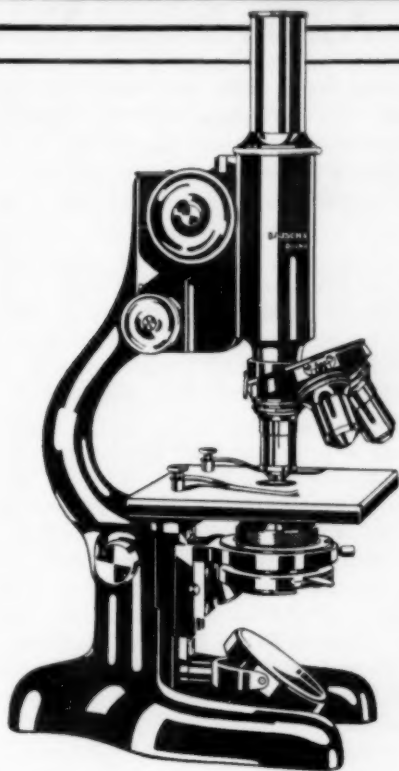
In the perennial debate, that never seems to approach a conclusion, as to what should be our national flower, the columbine has always had a solid body of staunch advocates. The chance resemblance of its name to Columbia, the poetic title given to the United States in the later eighteenth century, may have something to do with it. But more probably it is simply a matter of the recognition of the beauty of the graceful plant that in a number of species ranges over a very considerable portion of our country.

The commonest columbine of the eastern United States is the vivid orange-colored species sometimes called the Canada columbine. Not that it is peculiar to Canada, but that in old French days a good deal of the territory beyond the Alleghenies was considered a part of Canada. The Rocky Mountain long-spurred columbine is a magnificent blue, and the Yellowstone Park area boasts a species that is appropriately lemon-yellow.

The saltier-minded among our political commentators might point out a parallel between the somewhat inconsistent American temper, which alternates between truculence and pacifism, and the two mutually contradictory names of the columbine. For the Latin name of the plant is *Aquilegia*, which comes from the word meaning an eagle. The name was suggested by the claw-like cluster of the flower-spurs. And the common name, columbine, is also taken from the Latin, but refers to doves!

But to such scoffers it might be countered that the eagle's claws are tipped with beads of honey, and that this dove-named plant is very hardy and able to take care of itself in all wind and weather. It even thrives in dry places, though it prefers a reasonable amount of moisture.

Science News-Letter, June 14, 1930

Bearing Witness
of Its Origin »

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Glass Houses May Become Reality

Engineering

Walls Thin As Cardboard Now Possible

THE coming of the steel and glass skyscraper of the future, its height limited by economic considerations rather than by structural difficulties, is being hastened by the use of sheet metal largely to replace brick and stone in the new Empire State Building now being erected in New York.

A silvery chrome-nickel-steel alloy in angular sections one-twentieth of an inch thick will form a large part of the walls of the building. The metal was first developed for gun linings and is unrusting, non-tarnishing and unaffected by weather.

Such thin walls are likely to be used for buildings of the future. Some architects feel stone and brick walls for skyscrapers are not in keeping with steel structurally and are merely a heritage. The metal is said to save floor space, cost less and weigh less, give more light and result in better health for the occupants. Glass would be used to such an extent that partitions and great portions of outside walls would be made of it.

This tallest skyscraper in the world, being erected on the site of the old Waldorf-Astoria hotel at 34th St. and Fifth Ave., will be the nearest approach to the structural limit of 2,000 feet as determined by computations of the American Institute of Steel Construction. Its 85 floors will rise 1,043 feet high, and the building itself will be surmounted by a 200-foot observation platform or mooring mast for airships.

It is taller than the Eiffel tower

which rises 1,000 feet. The City Bank and Farmers Trust Co., will be 925 feet, and the Bank of Manhattan 838 feet tall. The Chrysler building soars 808 feet and the Woolworth building 792 feet.

The enormous weight of elevator cables, the inability of the human ear to withstand rapid pressure changes in an elevator going faster than 1,500 feet per minute, and the large floor area needed for elevator shafts make it impracticable to exceed the approximate 2,000 foot structural height limit.

The economic height depends upon the cost of land, the Steel Institute says. Its studies show that where land value is \$200 per square foot, a 63-story building brings greatest returns. When the value is \$400 per square foot, a 75-story building is considered most economical.

Science News-Letter, June 14, 1930

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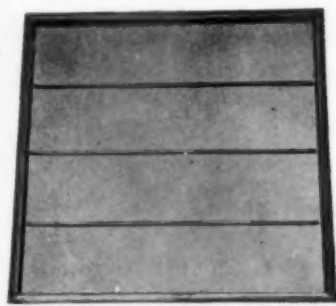
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National Color Society

TO provide a forum for those utilizing color in industry, art and science, the National Color Society is being organized.

When the U. S. Pharmacopoeia Convention met here recently one of the problems that confronted it was the accurate use of color names. There were assembled experts interested in the application of color to pharmaceuticals, chemicals, paints, dyes, textiles, inks, ceramics and many other products of industry as well as in art. Out of this meeting there arose preliminary plans for the National Color Society.

One of the principal objects of the new society will be to encourage the general use of one or, if necessary, several basically sound systems for precisely designating specific color wherever exact specification of color is required. The new society expects to cooperate with other national organizations interested in the standardization of color and it is expected to advocate government participation in the setting of color standards.

A British Color Council was established last year, and an international color conference, as a preliminary to the adoption of an international color card, has been suggested to facilitate the world standardization of color.

Physics

Science News-Letter, June 14, 1930

FIRST GLANCES AT NEW BOOKS

MEXICAN IMMIGRATION TO THE UNITED STATES—Manuel Gamio—*Univ. of Chicago Press*, 262 p., \$3. One of Mexico's leading men of science presents an array of facts about the Mexicans who cross our border, either permanently or transiently. The present situation is unsatisfactory, he concludes. Mexicans do not readily become assimilated to American civilization, even if they are naturalized. The influx of temporary Mexican labor, on the other hand, solves some economic problems both for jobless Mexicans and for American employers. Dr. Gamio recommends that, for the good of both Mexico and the United States, steps should be taken to restrict permanent migration. Temporary migration, he feels, is advantageous to both countries, but present methods of dealing with the contract labor reveal much need of improvement. Various specific recommendations are made.

Sociology—Ethnology

Science News-Letter, June 14, 1930

GRASSES OF INDIANA—C. C. Deam—*Dept. of Conservation, Indianapolis*, 356 p., \$2. A well-worked-out flora of Indiana grasses, companion volume to *Trees of Indiana* and *Shrubs of Indiana* which have already appeared. Each species description is accompanied by a record of distribution and a distribution map. A chapter on *The Grass Plant* by Prof. Paul Weatherwax, who also did the excellent line illustrations, will be especially useful to beginners.

Botany

Science News-Letter, June 14, 1930

YOURSELF, INC.—Adolph Elwyn—*Bretano's*, 320 p., \$3.50. The story of the human body told in an interesting and clear fashion with a number of really explanatory illustrations.

Physiology—Anatomy

Science News-Letter, June 14, 1930

MODERN LIGHTING—Frank C. Caldwell—*Macmillan*, 365 p., \$4.25. A very complete and up-to-date description of a field in which it is hard to keep up with developments. Lighting for factory, home, street, auditorium, skyscraper, window display, and moving picture projection—all affecting the individual many times every day—are adequately taken up.

Illuminating Engineering

Science News-Letter, June 14, 1930

X-RAY TECHNOLOGY—H. M. Terrell and D. T. Ulrey—*Van Nostrand*, 256 p., \$4.50. The book is designed to give the practical aspects of X-ray measurements. Particular attention is given to the quantitative measurements used in giving X-ray treatments and in industrial work.

Röntgenology

Science News-Letter, June 14, 1930

THE PROTEASES OF PLANTS—S. H. Vines—*Macmillan*, 32 p., 1s. A discussion of some controversial points regarding the protein-digesting enzymes found in plants.

Plant Physiology

Science News-Letter, June 14, 1930

BEARING METALS AND BEARINGS—W. M. Corse—*Chemical Catalog Company*, 374 p., \$7. Love may make the world go round, but it turns in bearings. The easier the world turns in its bearings, the more efficient our whole machine age becomes. Thus the importance of this compendium of bearing history and literature might be indicated. It represents the coordination of practically all available knowledge upon the topic.

Metallurgy

Science News-Letter, June 14, 1930

CLASSROOM GUIDE TO THE BOOK OF KNOWLEDGE—Editor-in-Chief Ellis C. Persing—*Grolier Society*, 591 p., \$4. Outlines of 500 well-planned units in geography, history, biology, poetry, stories, art, health, science, character education, and reading. Each lesson contains an outline of facts to be developed by the teacher, a set of questions, suggested procedure for the lesson, suggestions for picture study and for further reading. The material on which the lessons are based and the supplementary reading are in the twenty volumes of the "Book of Knowledge" to which page references are given. The teacher may use the book alone, however, as an aid in planning lessons and outlining questions. The lesson units range from material suitable for primary grades up through high school.

Education

Science News-Letter, June 14, 1930

THE ECONOMICS OF FORESTRY—W. E. Hiley—*Oxford Press*, 256 p., \$7. An exhaustive and thoroughgoing reference book that will be useful both to teachers of forestry and to forestry executives.

Forestry

Science News-Letter, June 14, 1930

LATEX—Ernest A. Hauser—*Chemical Catalog Company*, 191 p., \$4. "Excavations carried out by Dr. Gann and his associates during the past few years have disclosed a Maya civilization in British Honduras which dates from the eleventh century. Among the discoveries was a recreation field in the form of an arena where the favorite game of the Maya Indians was played. It consisted in throwing a rubber ball of approximately the size of a basketball through a stone ring fixed vertically in the wall of the arena. Whoever succeeded in shooting a goal received as a prize the cloaks of all the audience which sometimes amounted to 3000 or 4000." This paragraph is from the first chapter of a book which largely recounts neglected portions of the history of rubber. As its title indicates it is devoted primarily to rubber in its native state, as latex.

Chemistry

Science News-Letter, June 14, 1930

BIRD STUDY IN FLORIDA—R. J. Longstreet—*Halifax River Bird Club, Daytona Beach*, 183 p., cl., \$1.35; pa., \$1.75. The president of the Florida Audubon Society has done a service not only to his fellow Floridians but also to all bird lovers who come among the throngs of visitors to Florida, a state blessed far above the average with a wealth of bird life, much of it unfamiliar to most of us, the more fascinating because of its unfamiliarity.

Ornithology

Science News-Letter, June 14, 1930

METALLURGY OF WHITE METAL SCRAPS AND RESIDUES—Edmund Richard Thews—*Van Nostrand*, 375 p., \$5.50. American metallurgists are turning their attention to the saving of 29 per cent. waste in the metal trades. This text, possibly the first of its kind, describes the mechanical, chemical and metallurgical treatment of metallic scraps and residue of the white metals.

Metallurgy

Science News-Letter, June 14, 1930

FLORA OF THE INDIANA DUNES—D. C. Peattie—*Field Museum*, 432 p., \$2. An addition to the local-flora literature that should prove very useful in the Chicago area. It is illustrated with a number of good halftone plates.

Botany

Science News-Letter, June 14, 1930

First Glances at New Books—Continued

THEATRE LIGHTING—Louis Hartmann—*Appleton*, 131 p., \$2. This is the story of the man who does not bow to applause before the footlights, yet he makes the footlights themselves and the many other bewildering effects of modern theatre lighting, which are essential to the success of present day productions. David Belasco has paid him tribute for 28 seasons in the following line on the programs of his plays: "Electrical effects by Louis Hartmann." Like many who claim they cannot write but have undoubted enthusiasm and love for their work, Mr. Hartmann has written a very interesting story. It concerns the past 30 years of stage lighting.

Illuminating Engineering
Science News-Letter, June 14, 1930

REPORT OF THE COMMITTEE ON SEDIMENTATION, 1928-1930—*National Research Council*, 122 p., \$1. The researches and collations of the Committee on Sedimentation may well be termed "current geology." They will be interesting and useful to those who are interested in the economic aspects of the deposition of solid burdens by water, as well as by those who are more concerned with "straight geology."

Geology
Science News-Letter, June 14, 1930

THE DEVELOPMENT OF THE VEGETATION OF NEW YORK STATE—William L. Bray—*N. Y. State Coll. of Forestry*, 189 p., gratis. The usefulness of this publication to ecologists, plant geographers and botanists generally is attested by the fact that it has now entered a second edition.

Plant Ecology
Science News-Letter, June 14, 1930

AUDEL'S NEW ELECTRIC LIBRARY—*Theo. Audel & Co.*, 7 volumes, 3,630 p., \$10.50. Unusually well-illustrated, practical handbooks of electricity. Five more volumes to be published will include such recently developed fields as talking picture, illumination, refrigeration, and farm appliances.

Electricity
Science News-Letter, June 14, 1930

THE STUDY OF BIRDS—E. M. Nicholson—*Cope and Smith*, 125 p., 60c. A compact little book dealing mostly with methods of procedure for the beginner in field ornithology. Although written mainly with reference to British conditions, it will yield material of value to American bird students.

Ornithology
Science News-Letter, June 14, 1930

THE NEST—Henrietta C. Barr and Mina P. Drew—*Marshall Jones*, 58 p., \$1. Elements of ornithology for first-graders, cleverly illustrated with cut-out silhouettes in black and white. It tells the story of a bird's nest from the building and egg-laying in the spring to the desertion and the coming of snow in the autumn, with a side-lesson in kindness to helpless young birds thrown in for good measure.

Nature Study
Science News-Letter, June 14, 1930

ADVANCED MATHEMATICS FOR STUDENTS OF PHYSICS AND ENGINEERING—D. Humphrey—*Oxford University Press*, 172 p., \$4.25. Pure mathematics in contrast with practical mathematics. The author aims to give the student "manipulative skill" which he says can be readily applied when practical problems occur.

Mathematics
Science News-Letter, June 14, 1930

THE STRUCTURE OF LINE SPECTRA—Linus Pauling and Samuel Goudsmit—*McGraw-Hill*, 263 p., \$3.50. No field of modern physics is more important than spectroscopy. Through their light, atoms fly their unmistakable flags and show their colors. In the spectrum lines scientists read the intricate story of the constitution of matter and the way that it is put together. This volume in the International Series In Physics emanating from the California Institute of Technology and the University of Michigan brings up-to-date the theoretical background of the principles governing the structure of line spectra, and experimental data is introduced only as illustrative examples.

Physics
Science News-Letter, June 14, 1930

THE GROWING BOY—Paul Hanly Furfey, 192 p., \$2. Deals chiefly with the development of personality in boys between their sixth and sixteenth years. These growing years, which have been rather neglected by science in the rush to explain the pre-school child, have been studied by Dr. Furfey through clinical observations and case histories and through use of objective tests. The changes in boys' interests, attitudes, and capacities as they advance in years are very clearly and simply shown, so that the book should be useful to teachers, scout leaders, and parents, as well as to specialists in child development.

Psychology
Science News-Letter, June 14, 1930

KRUPP—ed. by Wilhelm Berdrow, transl. by E. W. Dickes—*Dial Press*, 416 p., \$5. An astonishing share of the history of Germany from 1826, when she was barely raising her neck from the weight of the Napoleonic heel, to 1887, when she was preparing to challenge the world in the fields of industry and war, is contained in this collection of the letters of this one man, who even more than her kings and chancellors wrought toward the greatness of *Deutschtum*.

Biography
Science News-Letter, June 14, 1930

PROCEEDINGS OF THE NINTH ANNUAL MEETING OF THE HIGHWAY RESEARCH BOARD—Roy W. Crum (editor)—*National Research Council*, 403 p., \$2. The basic material for better roads in America is not so much the subgrade of stone or concrete that underlies the actual highways as the scientific researches conducted in order that engineers may know how to build better and more economical highways for America's automobiles and trucks. One of the principal coordinating agencies for highway research is the Highway Research Board organized under the National Research Council. Its annual meetings and the volumes of proceedings that result are fundamental contributions to the literature of highway engineering.

Highway Engineering
Science News-Letter, June 14, 1930

THIS NEW AGE—Sarah McLean Mullen and Muriel Simpson Lanz—*Century*, 322 p., \$1.12. A textbook intended to infuse into the young student some of the spirit of the "wonderful age in which we are living." The four sections are devoted to getting material, conquering distance, giving wings to the world and looking forward. Adult readers will be worried by the questions and comprehension tests that follow each chapter and the schoolroom flavor.

General Science
Science News-Letter, June 14, 1930

MEN WHO FOUND OUT—Anabel Williams-Ellis—*Coward McCann*, 259 p., \$2. These lively hero stories of scientific research originally told to the author's own inquisitive children on English country weekends, give vivid pictures of Galileo, Harvey, Van Leeuwenhoek, Faraday, Darwin, Pasteur, Lister, Madame Curie and a few other historical personages.

General Science
Science News-Letter, June 14, 1930